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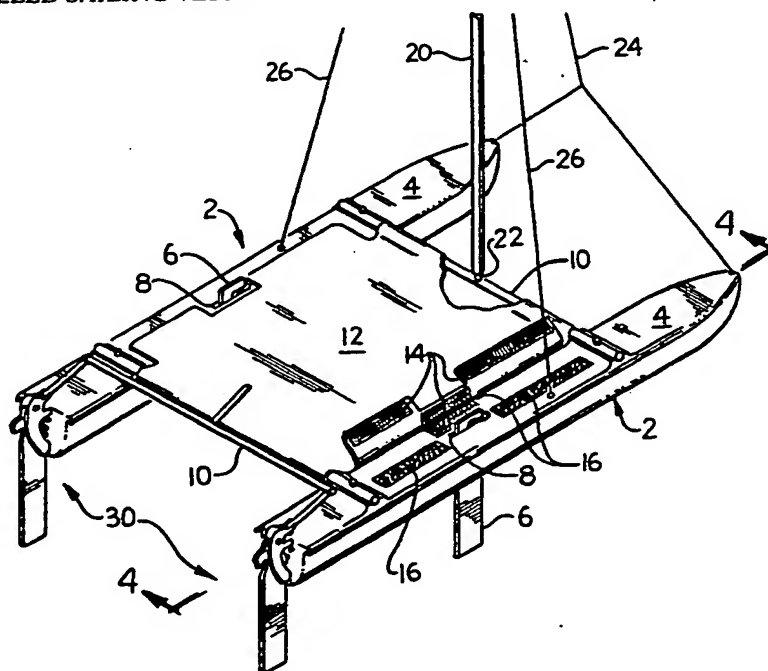
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(54) Title: TWIN-HULLED SAILING VESSEL



(57) Abstract

A twin-hulled collapsible sailing vessel, including: a pair of elongate hulls (2); a pair of cross-members (10) holding the hulls in alignment, sized and constructed to fit within one of the hulls; a trampoline (12) extending between the cross-members, sized and constructed to fit within one of the hulls; a mast (20) supportable by one of the pair of cross-members, sized and constructed to fit within one of the hulls; a sail (40), sized and constructed to fit within one of the hulls and a rudder assembly (30), sized and constructed to fit within one of the hulls.

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-1-

## TWIN-HULLED SAILING VESSEL

### Background of the Invention

This invention relates to sailing vessels, and in particular to collapsible sailing vessels.

5 Since the cost of purchasing and maintaining larger sailing vessels is beyond the financial means of many sailing enthusiasts, sailboats in the fourteen to eighteen foot range have become extremely popular. In addition to the lower initial cost of these boats, the boats can be removed from the water and stored on land after each use, thereby eliminating the need for maintaining a permanent dock. Nonetheless, many individuals are unable or find it inconvenient to purchase and store a sailboat and trailer.

10 Previous attempts to alleviate these problems by providing collapsible sailing vessels have proved unacceptable. Generally, these vessels, although more compact than non-collapsible sailing vessels, take up a large amount of storage space. Those vessels large enough for multiple passengers are generally too heavy to easily transport, while smaller vessels are usually unstable and unsuitable for multiple passengers. Furthermore, these collapsible sailing vessels require too much time and effort to assemble and disassemble.

15 What is needed is an easily assembled, collapsible sailing vessel which is light and compact when stored, but which forms a comfortable, stable, multi-passenger sailing vessel when assembled.

### Summary of the Invention

20 This invention is a twin-hulled sailing vessel. The vessel is provided with a pair of elongate hulls, a pair of cross-members hold the hulls in alignment, and a trampoline extending between the cross-members. The boat is further provided with a mast which is supportable by one of the cross-members and a sail. The boat also includes a rudder assembly. To permit the vessel to be conveniently stored, the rudder assembly, the sail, the

25 30 35

mast, the trampoline, and the cross-members are all sized and constructed to fit within one of the vessel's pair of hulls.

5 The vessel's hulls are each advantageously provided with a retractable keel or daggerboard.

10 In one embodiment of the invention, the hulls include a substantially open end, and the vessel is further provided with a pair of plugs which are insertable into the open ends to seal the open ends. Advantageously, a seat located within each of the open ends of the hulls limits the axial movement of the plugs within the hull.

15 Preferably, the rudder assembly includes a pair of rudder blades, each of which is mounted to one of the hulls by retractable pintle within the open end of the hull.

20 Advantageously, each of the hulls is provided with a pair of raised yokes for receiving the cross-members, and the trampoline and the hulls are provided with mating Velcro fasteners to hold the trampoline taut.

#### 20 Description of the Drawings

Figure 1 is a perspective view of a twin-hulled sailing vessel embodying the present invention;

Figure 2 is a front elevational view of the vessel of Figure 1;

25 Figure 3 is a side elevation view of the vessel of Figure 1;

Figure 4 is a enlarged partial sectional view taken along 4-4 of Figure 1;

30 Figure 5 is a partial sectional view taken along 5-5 of Figure 4;

Figure 6 is an exploded perspective view of the connection between the cross-members and hulls of the vessel of Figure 1;

35 Figure 7 is a partial sectional view illustrating the connection between the assembled hull and cross-member;

-3-

Figure 8 is a cross section along lines 8-8 of the transom area of the vessel of Figure 1;

Figure 9 is a rear elevation of the transom area of the vessel of Figure 1;

5      Figure 10 is a detailed side elevation partially in cut-away of the rudder and transom area of the vessel of Figure 1;

10      Figure 11 is a perspective view of one hull of an alternative embodiment of a vessel according to this invention, illustrating the parts of the boat stored therein;

Figure 12 is a perspective enlargement of the junction between hull halves of the catamaran of Figure 11;

15      Figure 13 shows a method of carrying the hulls of Figure 11;

Figure 14 is a perspective view of an alternative embodiment of a vessel of the present invention utilizing a two-piece hull as illustrated in Figure 11.

#### Description of the Preferred Embodiment

20      Referring to Figure 1, a twin-hull vessel or catamaran 1 has a pair of hulls 2, each of which include a deck 4. A pair of retractable keels or daggerboards 6 pass through a trunk 8 to extend below the hull to stabilize the vessel and to prevent side slip when the catamaran is under  
25      sail. The hulls are connected by a pair of elongate cylindrical cross-members 10. Naturally, the mast 10 could also be of the telescoping variety. The vessel includes a trampoline 12 having looped ends, which is suspended between the cross-members 10, so that the cross-  
30      members 10 support the bulk of the weight of the trampoline and any passengers resting thereon. Mating Velcro fasteners on the trampoline 14 and the decks 6 help support the trampoline 12 and hold the trampoline tautly centered between the hulls 2. This means of attachment  
35      permits the trampoline 12 to be tightened to any desired

-4-

tension and to be easily and quickly mounted and dismounted.

A two-piece mast 20 is supported within a step 22 in the forward cross-member 10. A forestay 24 and a pair of shrouds 26 hold the mast 20 in place. The vessel is steered by a rudder assembly 30 which will be described in greater detail hereinafter. Referring now to Figure 3, the vessel 1 is shown with a main sail 40 and a jib 42. The jib 42 is trimmed by sheets 46 and 44, respectively.

As shown in phantom in Figure 4, all the components of the vessel, including its mast 20 and sails, 40 and 42, can be stowed within the hulls 2 on either side of the centerboard trunk 8. Preferably, the cross-members 10 are stored with the trampoline wound between them.

Each hull includes a pair of raised yokes 50 for receiving and retaining the cross-members 10. As shown in greater detail in Figure 6, the cross-member 10 is received within the yoke 50 and is held there by a single bolt 52 having a handle portion 54, a shaft portion 56, and a threaded portion 58. The threaded portion 58 passes through a C-shaped clip 60 and is threaded into the yoke 50. The clip 60 secures the bolt 52 to the cross-member 10 and prevents the bolt 52 from being lost when the vessel is disassembled. As shown in Figure 7, the yoke is advantageously provided with a metal plate 61 which reinforces the connection between the bolt 52 and the yoke 50 and distributes the stress of the connection over a larger surface area. The yokes 50 overcome any torque about the axis of the bolts 52, thereby permitting a single bolt to be used to attach each cross-member 10 to each hull 2.

As can be readily understood from Figures 4-7, the flat upper surfaces 51 of the yokes 50 permit the two hulls 2 of the catamaran 1 to be stacked deck-to-deck on top of one another for convenient storage. While stored in this manner, the mating upper surfaces of the yokes

-5-

will be the only portion of the two hulls touching one another. This means that the yokes 50 of the lower hull 2 will support the entire weight of the upper hull. Advantageously, a short length of tubing equal in diameter to the cross-members 10 may be positioned between each pair of mating yokes to prevent the hulls from sliding relative one another during storage.

Referring to Figure 8, the tubular body 70 of the hull 2 is provided with a seat 72 mounted to the inner wall of the tubular body to align and limit the axial movement of a plug 74 within the hull. The plug is comprised of a pair of compression plates 80 mounted on a bolt 82. Between the plates 80 is a layer of foam rubber 84. A handle 86 is mounted on one end of the bolt 82 and a nut 88 is provided on the other end of the bolt. When the handle 86 is rotated relative to the nut 88, the bolt 82 threads into or out of the nut 88, thereby compressing or releasing the plates 80 relative to one another. By compressing the plates against one another, the foam rubber can be expanded so that it extends outwards and forms a seal with the seat 72 (as shown in Figures 9 and 10). This seal can be released by merely turning the handle 86 and releasing the pressure on the foam rubber so that it contracts within the circumference of the plates (as shown in Figure 8).

Referring to Figure 10, the rudder assembly at the rear of each hull includes a rudder blade 90 and a tiller 92, both of which are mounted to a rudder head 94. The rudder blade is preferably rotatably mounted to the rudder head by a pivot pin 96. The tiller 92 is rotatably mounted to the rudder assembly 30 by a pivot pin 100. The pivot pin 100 permits the tiller 92 to be rotated counter-clockwise (as shown in Figure 10) until the tiller 92 is vertical and is prevented from further rotation by the cylindrical upper edge 93 of the rudder head 94. Preferably, the end of the tiller 92 which rotates within

-6-

the rudder head 94 is cupped by a partial cylindrical wall within the rudder head 94 when the tiller 92 is vertical. This mechanism permits the blade 90 and the tiller 92 to be easily stored within the hull 2.

5     The blade 90 can also be rotated backward from the hull about the pivot pin 96 to avoid collision damage when the boat is in shallow water or is being beached. A handle 102 is also provided to permit the blade 90 to be manually raised. To prevent the blade from rotating  
10   backward during sailing, a Velcro strip 104 releasably holds the blade to the head 94.

15    The rudder assembly 30 is rotatably mounted to each hull by two pintles, 110 and 112, which are mounted on the head 94, and are fitted rotatably into holes 120 and 122 in the hull.

20    The lower pintle 112 is fixed to the head 94 and fits into the hole 120 which extends through the seat 72 and the hull 2. The upper pintle 110 mounts into a hole 122 in the seat 72 and the deck 4 of the hull 2. To permit the quick and easy installation of the rudder, the pintle 110 moves up and down relative the head 94 in a channel 130. A pintle pull down shaft 132 permits the retraction of the pintle 110 downward out of the hole 122 and into the channel 130. Whenever the pintle pull-down shaft is  
25   released, a compression spring 134 within the channel 130 biases the pintle 110 outward.

30    In mounting the rudder on the vessel, the fixed pintle 112 is inserted into the lower hole 120, the pintle pull down shaft 132 is lowered, the pintle 110 is aligned with the hole 122 and the shaft 132 is released, so that the spring 134 forces the pintle 110 into the hole 122. When it is desired to remove the rudder 130 from the vessel, it is merely necessary to pull down the shaft 132 to retract the upper pintle 110, slide the upper portion of the head 94 clear the hull 2, and lift the lower pintle out of the  
35   hole 120.



Referring to Figures 11 and 12, an alternative embodiment of a sailing vessel of the present invention is shown. The vessel has a forward container 140 and a rear container 142 held together by a latch system 144. A sleeve 146 causes the two containers 140 and 142 to slide together in a tight fit. The latch system 144 has a hook 150 on one container, a claw 152 on the other container, said claw 152 being mounted to a compression lever 154 that pivots at 158 about a base 160 mounted upon the hull 2. When the two containers 140 and 142 have been joined and pushed snugly together, the claw 152 is locked over the hook 150 which is then pulled tight by the compression lever 154. This compresses an O-ring 162 into an O-ring seat 164 thereby creating a water-tight seal.

Referring to Figure 13, the two containers 140 and 142 can be seen to be easily carryable by one person using handles 170. Preferably, these handles are located at the center of weight of each container. As shown in Figure 11, all exterior equipment of the vessel, including the mast, rudder, keel, cross-members 10, sails 40 and 42, and trampoline 12 can easily be carried in the four containers 140 and 142 formed from the two hulls of the catamaran. Figure 14 shows this embodiment in its assembled form.

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IN THE CLAIMS:

1. A twin-hulled sailing vessel, comprising:
  - a pair of elongate hulls;
  - a pair of cross-members holding said hulls in  
5 alignment, sized and constructed to fit within one of  
said hulls;
  - a trampoline extending between said cross-  
members, sized and constructed to fit within one of  
said hulls;
  - 10 a mast supportable by one of said pair of cross-  
members, sized and constructed to fit within one of  
said hulls;
  - a sail, sized and constructed to fit within one  
of said hulls; and
  - 15 a rudder assembly, sized and constructed to fit  
within one of said hulls.
2. The sailing vessel of Claim 1, wherein each of  
said pair of hulls further comprises a trunk to receive a  
retractable keel.
- 20 3. The sailing vessel of Claim 2, wherein said  
assembly, said sail, said mast, said trampoline, and said  
cross-members are all sealable within one of said pair of  
hulls.
4. The sailing vessel of any of Claims 1 to 3,  
25 wherein each of said hulls includes a substantially open  
end, further comprising a pair of plugs insertable into  
said open ends to seal said open ends.
5. The sailing vessel of Claim 4, further comprising  
a seat located within each of said pair of hulls to limit  
30 the axial movement of said plugs within said hulls.
6. The sailing vessel of any of Claims 1 to 5,  
wherein each of said pair of hulls is separable into  
separate containers.
7. The sailing vessel of any preceding claim,  
35 wherein said assembly comprises a pair of rudder blades,

each of said blades mounted to one of said hulls by a retractable pintle within said open end of said hull.

8. The sailing vessel of Claim 7, wherein said retractable pintles are insertable into a hole within said open end of said hull exterior said seat.

9. The sailing vessel of Claim 8, wherein each of said pair of plugs comprises a layer of compressible material between two substantially rigid plates.

10. The sailing vessel of Claim 9, wherein each of said pair of plugs further comprises a handle secured to a threaded shaft and a member for receiving and retaining said threads of said shaft, wherein said plug is sealable within said open end of said hull by means of rotating said handle so that said plates compress said layer against said hull.

11. The sailing vessel of Claim 10, wherein each of said blades can be rotated upwardly.

12. The sailing vessel of Claim 11, wherein said assembly further comprises a pair of yoke-shaped rudder heads for receiving said pintles and a pivot pin fixed to each of said heads generally perpendicular to said pintle about which one of said pair of blades is rotatable.

13. The sailing vessel of any preceding claim, wherein each of said hulls is provided with a pair of raised yokes for receiving and retaining said cross-members.

14. The sailing vessel of any preceding claim, wherein said hulls and said trampoline are provided with mating Velcro fasteners to hold said trampoline taut.

15. The sailing vessel of any preceding claim, wherein said hulls are provided with raised yokes for receiving said cross-members.

16. The sailing vessel of Claim 15, wherein said hulls can be stacked on top of one another so said raised yokes support the entire weight of the upper hull.

1/5

FIG. 1

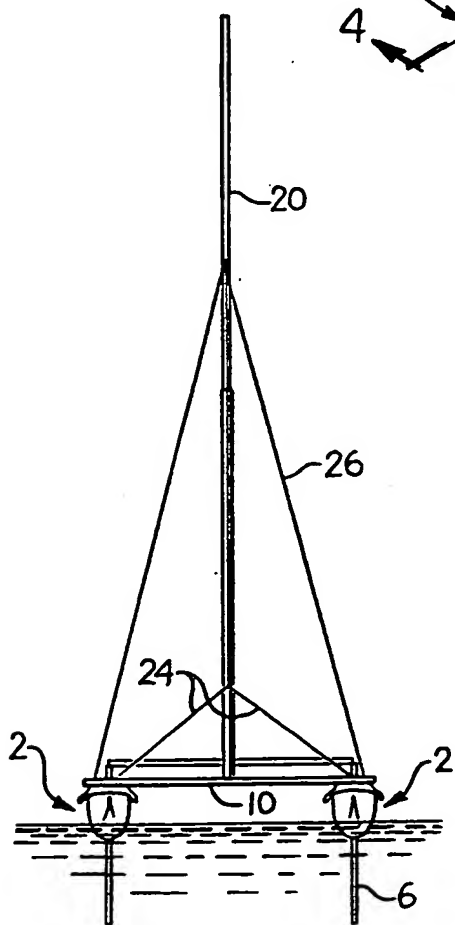
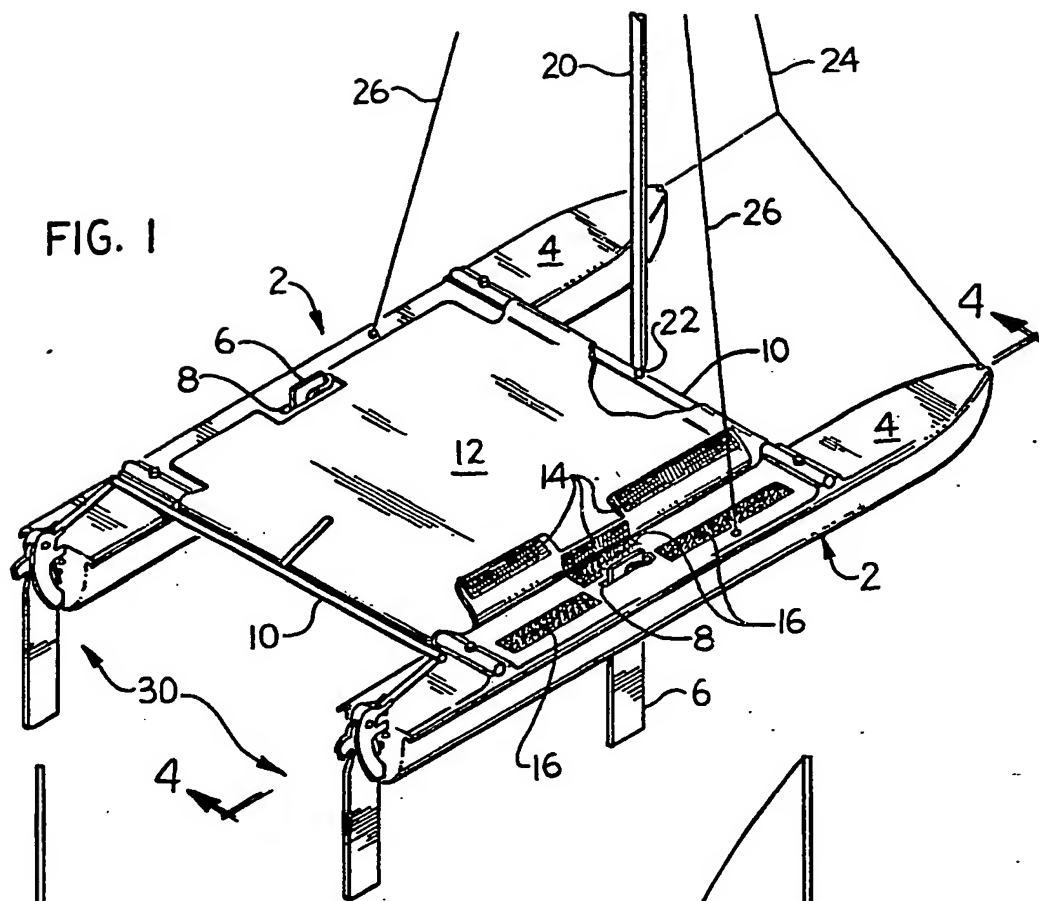


FIG. 2

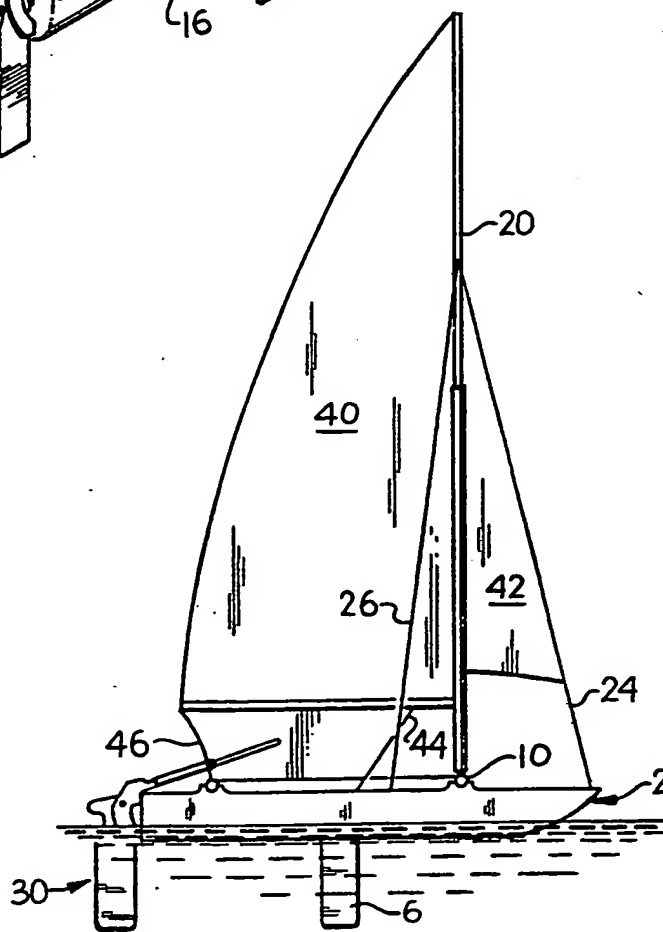


FIG. 3

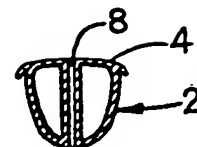
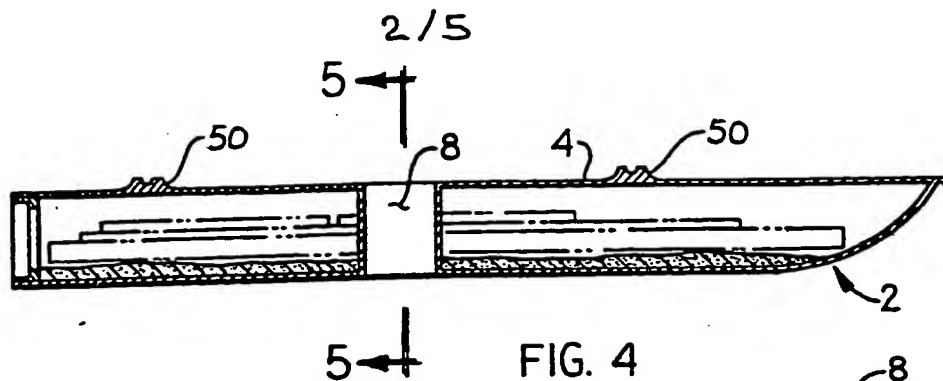


FIG. 5

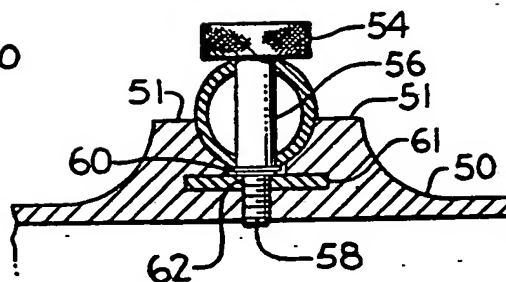
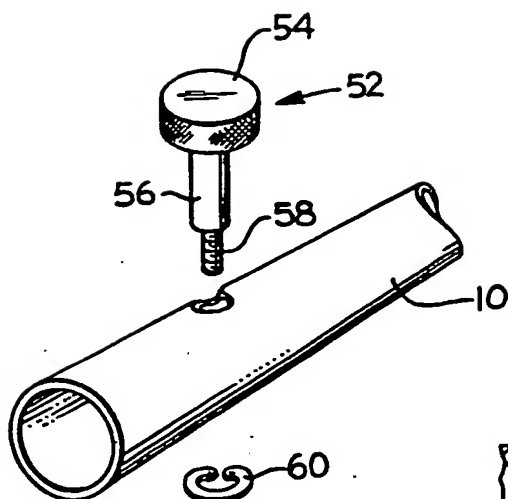
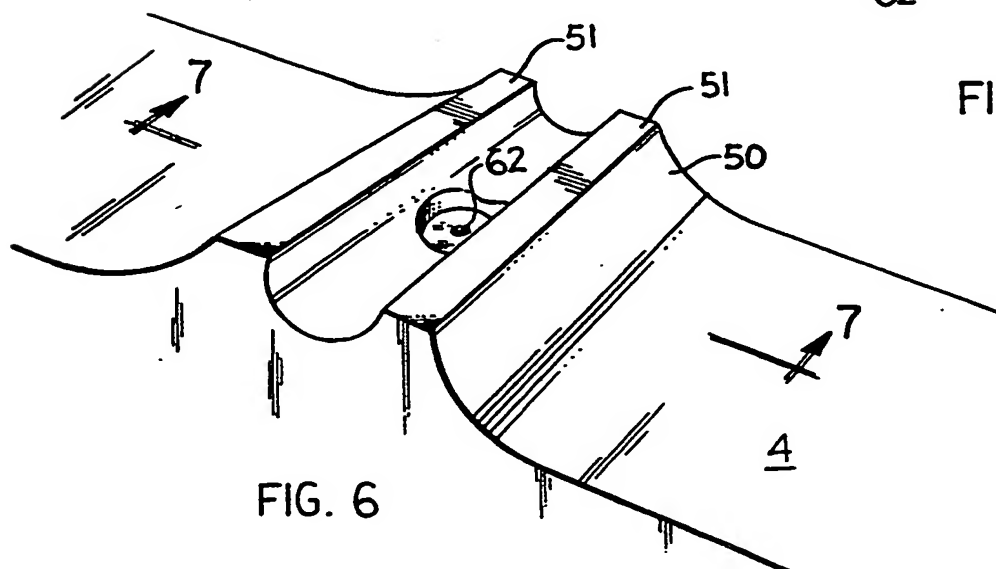


FIG. 7



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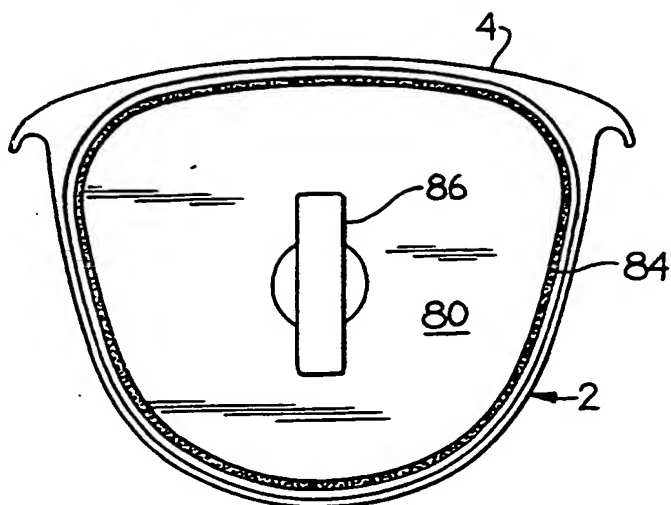


FIG. 9

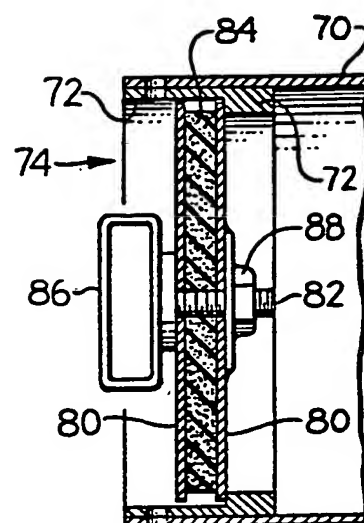


FIG. 8

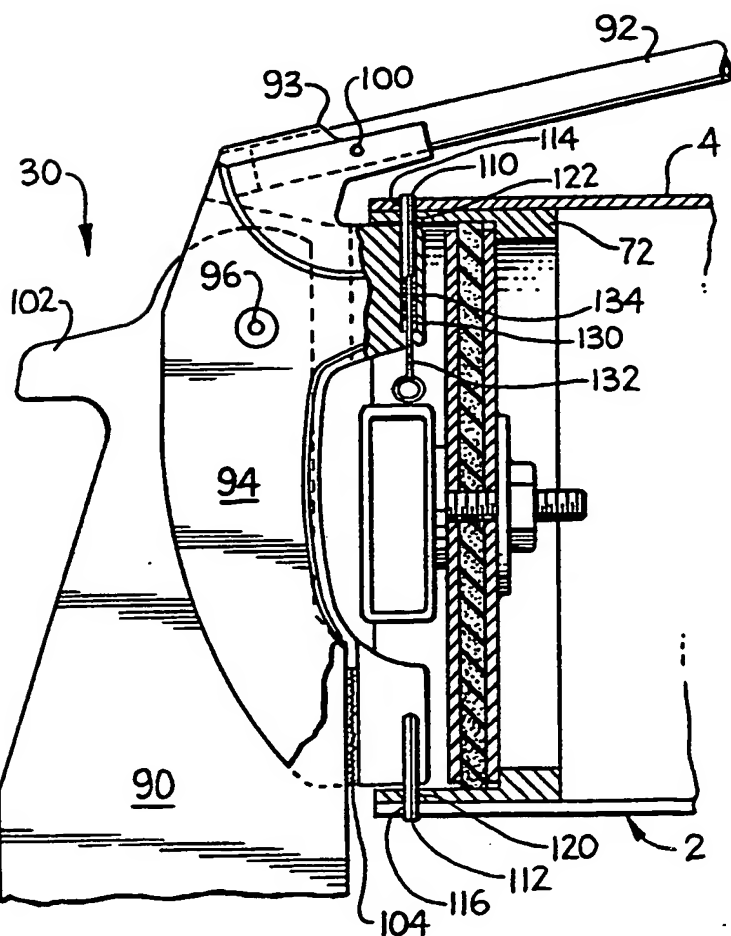


FIG. 10

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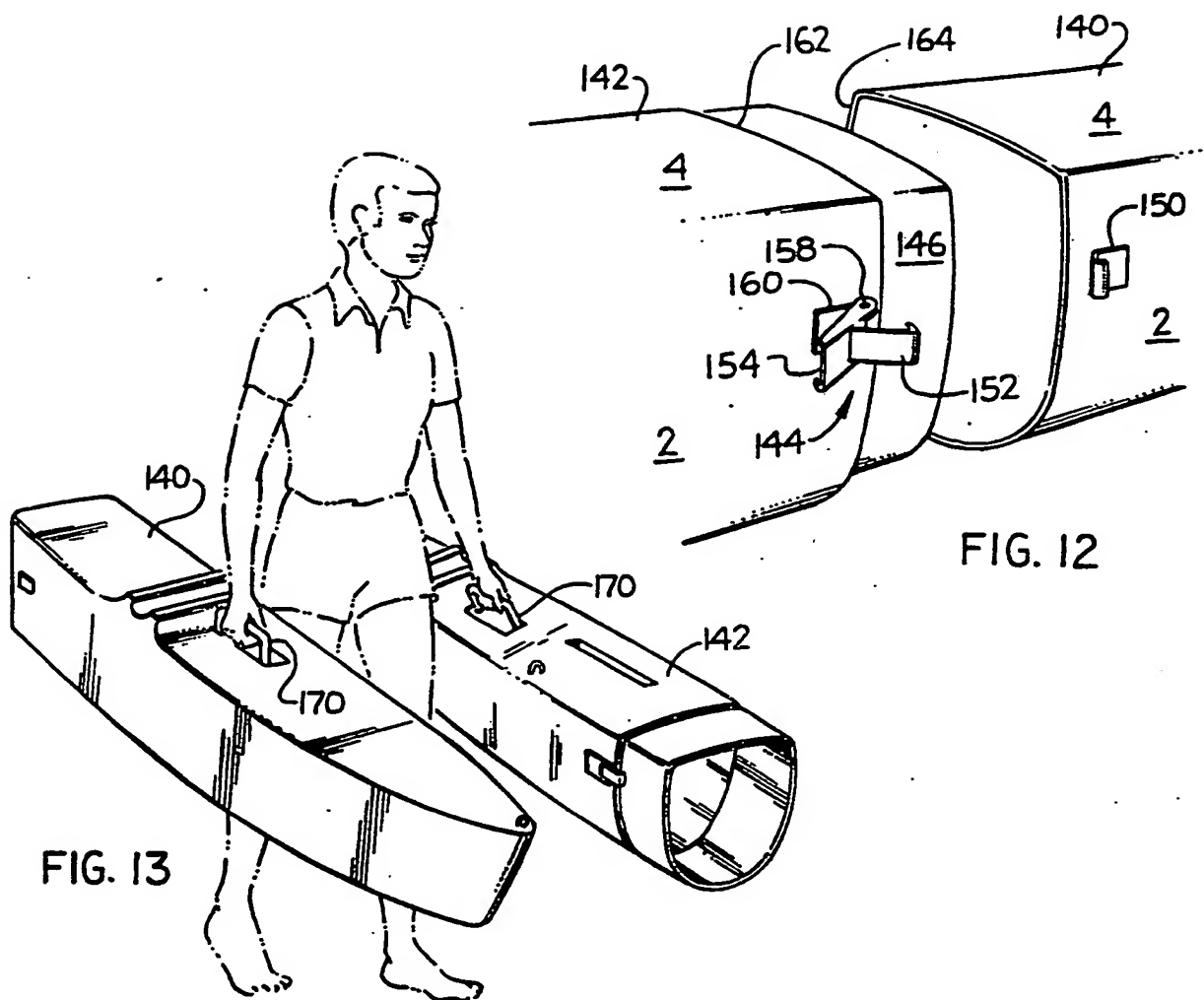


FIG. 13

FIG. 12

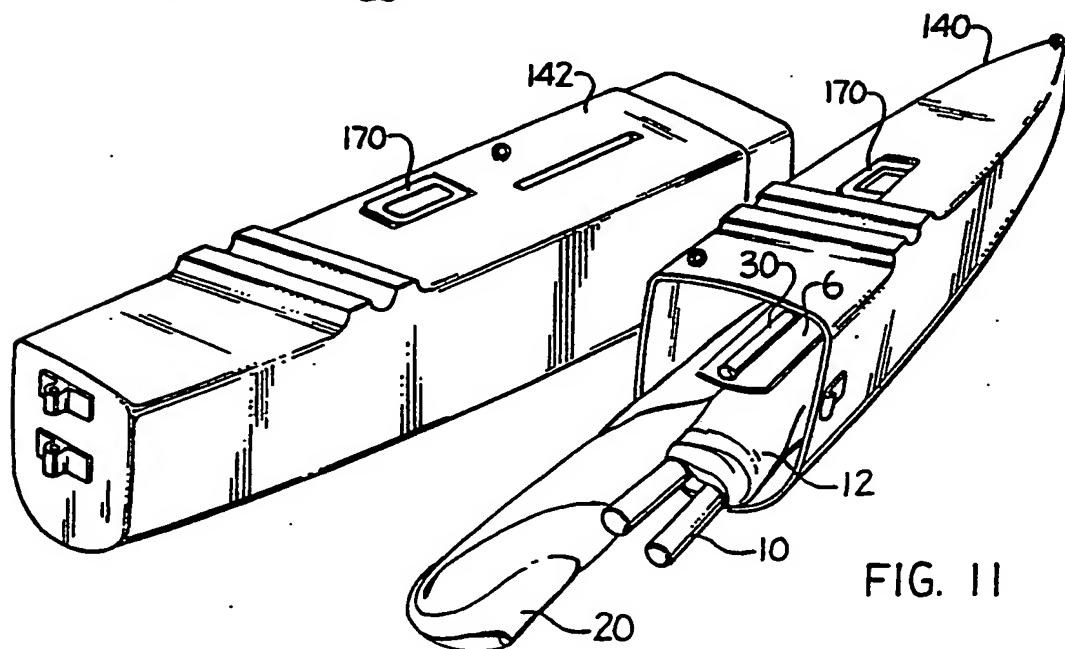


FIG. 11

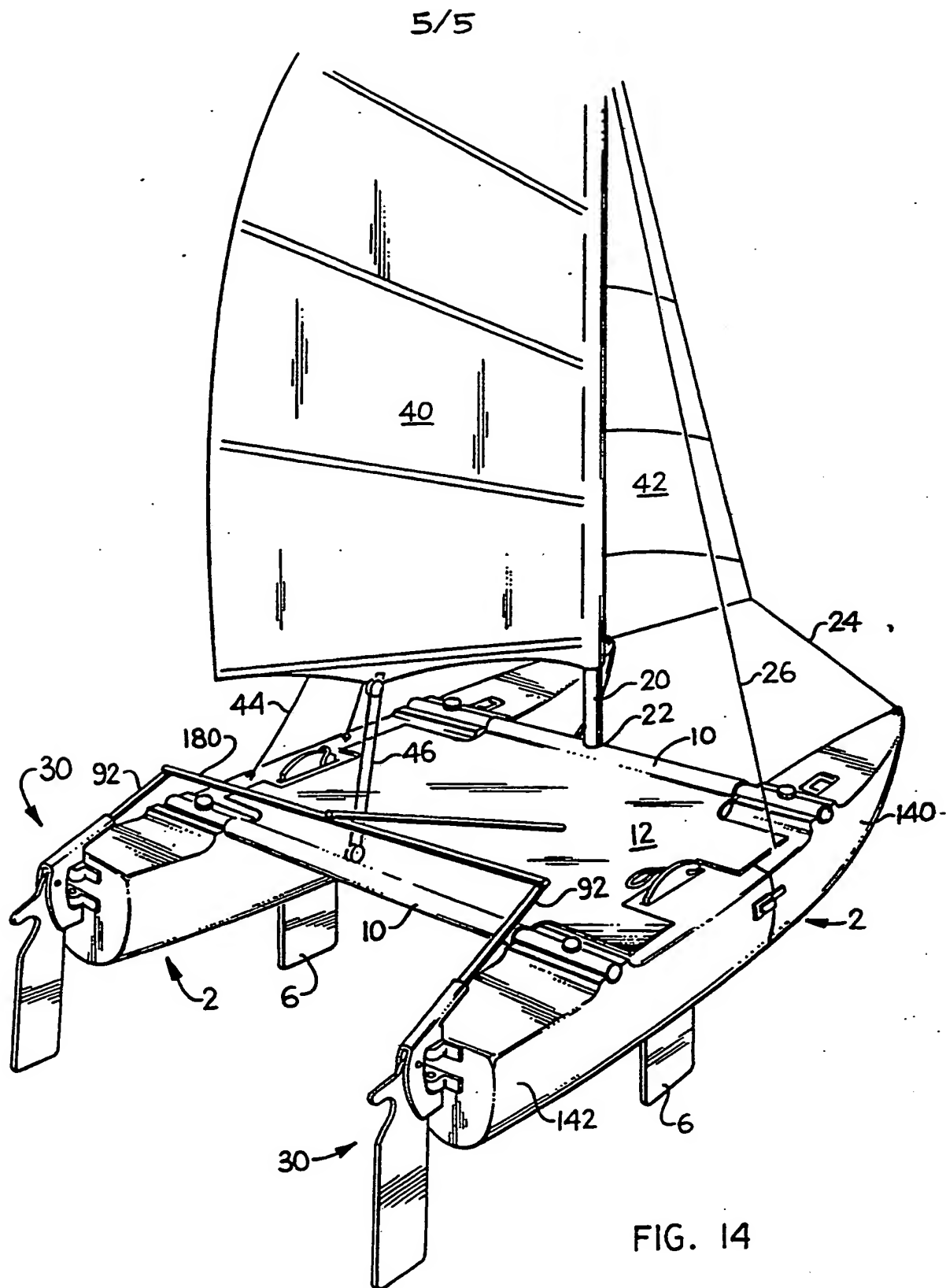


FIG. 14

# SUBSTITUTE SHEET



# INTERNATIONAL SEARCH REPORT

International Application No. **PCT/US 87/01129**

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>3</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <b>INT. CL. <sup>4</sup> B63B 25/00</b> <b>U.S. Class. 114/61</b>		
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Minimum Documentation Searched <sup>4</sup></div> <div style="display: flex; justify-content: space-between;"> <span>Classification System  </span> <span>Classification Symbols</span> </div> <div style="padding: 10px 0;"> <b>U. S.                    114/39, 61, 123, 127, 162, 163 352, 357</b> </div> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>6</sup></div>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>14</sup></b>		
Category <sup>5</sup>	Citation of Document, <sup>16</sup> with Indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>
Y	US, A, 3,796,175, (FORD ET AL) 12 May 1974	1,3-5,13,15
Y	US, A, 2,916,748, (STAMMER) 15 December 1959	1,3-5,13,15
Y	US, A, 4,401,047, (AURAS) 30 August 1983	2
Y	US, A, 4,029,038, (PFAHL) 14 June 1977	7-8
Y	US, A, 4,569,301, (PYBURN) 11 February 1986	14
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><sup>15</sup> Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Δ" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search <sup>8</sup>  <b>22 June 1987</b>		Date of Mailing of this International Search Report <sup>9</sup>  <b>23 JUL 1987</b>
International Searching Authority <sup>1</sup>  <b>ISA/US</b>		Signature of Authorized Officer <sup>20</sup>  <b>S. P. Avila</b>